

REMARKS

Claims 87-90 are now pending in this application. Claims 3, 4, 26, 27, 36-38 and 86 are rejected. Claims 3, 4, 26, 27, 36-38 and 86 are cancelled herein. Claims 1, 2, 5-25, 28-35 and 39-49 are previously cancelled. New claims 87-90 are added.

Claims 3, 4, 26, 27, 36-38 and 86 are now cancelled, rendering all rejections of record moot. However, insofar as the subject matter of new claims 87-90 reflects that of the cancelled claims, and in the event the Examiner considers asserting the present rejections against the new claims, applicants submit the following remarks.

Applicants believe that all newly added claims 87-90 read on the elected Group I, Specie (1). For the convenience of the Examiner, applicants indicate that the new claims have the following relationship with the subject matter of the prior presented claims.

New claim 87 is directed generally to technical features of cancelled claims 3, 4 and 38.

New claim 88 is directed generally to technical features of cancelled claim 26, in addition to the technical features of new claim 87.

New claim 89 is directed generally to technical features of cancelled claim 27, in addition to the technical features of new claim 87.

New claim 90 is directed generally to technical features of cancelled claim 36, in addition to the technical features of new claim 87.

Applicants respectfully submit that the presently claimed invention is distinguished over the art of record on the basis of at least three important elements, enumerated below.

(1) The metal body is moved along the extending direction, and at the same time, the non-low deformation resistance region is formed by the non-low deformation resistance region forming device along side peripheries of the low deformation resistance region at a downstream side in the moving direction. Accordingly, the metal body can be treated successively by moving along the extending direction.

(2) The low deformation resistance region which is heated, is rapidly cooled along side peripheries of the low deformation resistance region, and hence, it is also possible to enhance the hardness of the metal body having finer metal structure. Accordingly, it is possible to prevent the continuous heating state. Thus, it is possible to suppress the metal structure which is once turned into the finer grain structure from becoming coarse.

(3) The shearing of the low deformation resistance region includes imparting rotational motion which allows the rotation of one non-low deformation resistance region relative to another to the non-low deformation resistance region. Accordingly, the metal body can be treated successively by moving along the extending direction.

The JP'825 reference shows cooling means on the exit side of the device. Accordingly, the part of the metal body which is heated is not cooled. Further,

because the cooling means of JP'825 is not "rapidly cooled" after the metal structure of the metal body is heated. Thus, metal structure of the metal body is not turned into the finer grain structure efficiently. Additionally, such approach cannot prevent the finer grain structure from becoming coarse.

The present invention is different from JP'825 in cooling position and cooling method. Further, in accordance with JP'825, the metal body must be bent in shearing on the part heated by the heating means. However, the present invention does not involve bending of the metal body, but instead allows the rotational motion of one non-low deformation resistance region relative to another. Accordingly, the present invention can successively treat the metal body which extends in one direction.

JP'825 also differs from the present invention in other respects. For example, in heating the metal plate, only atmosphere about of the metal plate is heated, and thus only the atmosphere is heated up to a higher temperature. Accordingly, the metal mold of the metal plate in this invention is lower in cooling efficiency. Furthermore, this invention is not treated as moving along the extending direction. Accordingly, the metal plate of the cited invention is not able to turn a metal structure of the metal body into a finer grain structure successively.

US'574 shows that changing of the metal structure of the metal body into a finer structure is caused, not by rotation, but by vibration applied to the metal body. The invention of this cited reference is different from the present invention in vibration applied to the metal body.

Regarding the Double Patenting rejections, the cooling device of the present invention provides rapid cooling. Application Nos. 10/529,807 and 12/002,951 have no rapidly cooling device. When the metal body of the invention in applications No. 10/529,807 and No. 10/529,807 is cooled along the extending direction of the metal, it is not rapidly cooled, and further, it is not cooled alongside of peripheries of the low deformation resistance region at the downstream side of the direction of movement.

Particularly, application No. 12/002,951 and the present invention are different from each other in that vibration is applied to the metal body or rotational motion, and the reference fails to disclose a rapidly cooling device.

No fee is believed due. If there is any fee due the USPTO is hereby authorized to charge such fee to Deposit Account No. 10-1250.

In light of the foregoing, the application is now believed to be in proper form
for allowance of all claims and notice to that effect is earnestly solicited.

Respectfully submitted,
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